

CLAIMS

1. Method of identifying an anti-fungal agent which targets an essential protein or gene of
5 a fungus comprising contacting a candidate substance with
(i) a NADH:flavin oxidoreductase protein which comprises the sequence shown by
SEQ ID NO:3,
(ii) a NADH:flavin oxidoreductase protein which is a homologue of (i) and which
comprises the sequence shown by SEQ ID NO: 8, 12, 14, 19, 24, 42, 44, 83 or 85,
10 (iii) a protein which has 50% identity with (i) or (ii),
(iv) a protein comprising a fragment of (i), (ii) or (iii) which fragment has a length of
at least 50 amino acids,
(v) a polynucleotide that comprises sequence which encodes (i), (ii), (iii) or (iv),
(vi) a polynucleotide comprising sequence which has at least 70% identity with the
15 coding sequence of (v),
and determining whether the candidate substance binds or modulates (i), (ii), (iii), (iv), (v)
or (vi), wherein binding or modulation of (i), (ii), (iii), (iv), (v) or (vi) indicates that the
candidate substance is an anti-fungal agent.
- 20 2. Method according to claim 1 wherein (iii) or (iv) have an oxidoreductase activity.
3. Method according to claim 1 or 2 wherein (i), (ii), (iii) or (iv) comprise one or more of
the motifs defined by regions 1 to 11 in Figures 1 and 2.
- 25 4. Method according to any one of the preceding claims comprising carrying out a redox
reaction in the presence and absence of the candidate substance to determine whether the
candidate substance inhibits the oxidoreductase activity of a protein as defined in any one
of the preceding claims, wherein the redox reaction is carried out by contacting said
protein with NADH or NADPH; and an electron acceptor, under conditions in which in the
30 absence of the candidate substance the protein catalyses reduction of the electron acceptor.

5. Method according to any one of the preceding claims wherein (iii) is a protein comprising the sequence of any of the following: SEQ ID NO: 6, 10, 16, 22, 27, 30, 33, 35, 38, 40.

5

6. Method according to any one of the preceding claims wherein the (i) or (ii) is an oxidoreductase of *Aspergillus flavus*; *Aspergillus fumigatus*; *Aspergillus nidulans*; *Aspergillus niger*; *Aspergillus parasiticus*; *Aspergillus terreus*; *Blumeria graminis*; *Candida albicans*; *Candida cruzei*; *Candida glabrata*; *Candida parapsilosis*; *Candida tropicalis*; *Colletotrichum trifolii*; *Cryptococcus neoformans*; *Encephalitozoon cuniculi*; *Fusarium graminearum*; *Fusarium solani*; *Fusarium sporotrichoides*; *Leptosphaeria nodorum*; *Magnaporthe grisea*; *Mycosphaerella graminicola*; *Neurospora crassa*; *Phytophthora capsici*; *Phytophthora infestans*; *Plasmopara viticola*; *Pneumocystis jiroveci*; *Puccinia coronata*; *Puccinia graminis*; *Pyricularia oryzae*; *Pythium ultimum*; *Rhizoctonia solani*; *Schizosaccharomyces pombe*; *Trichophyton interdigitale*; *Trichophyton rubrum*; or *Ustilago maydis*.

10

15

7. Method according to any one of the preceding claims which further comprises formulating the identified anti-fungal agent into a agricultural or pharmaceutical composition.

20

8. Method according to any one of claims 1 to 6 which further comprises killing or impairing the growth of a fungus by contacting the fungus with the identified anti-fungal agent.

25

9. Use of (i), (ii), (iii), (iv), (v) or (vi) as defined in any one of claims 1 to 6 to identify or obtain an anti-fungal agent.

10. Use of an anti-fungal agent identified by the method of any one of claims 1 to 6 in the manufacture of a medicament for prevention or treatment of fungal infection.

30

11. Method of detecting the presence of a fungus in a sample comprising detecting the presence in the said sample of a protein or polynucleotide as defined in any one of claims 1 to 3, 5 or 6.

5

12. Method according to claim 11 wherein the sample is from an human, animal or plant individual who is suspected of having a fungal infection.

13. An isolated protein or polynucleotide as defined in any one of claims 1 to 3, 5 or 6.

10

14. A vector comprising a polynucleotide as defined in any one of claims 1 to 3, 5 or 6.

15. A recombinant cell comprising a polynucleotide as defined in any one of claims 1 to 3, 5 or 6 or a vector according to claim 14.

15

16. A method of obtaining a protein as defined in any one of claims 1 to 3, 5 or 6 comprising expressing the protein from a polynucleotide as defined in any one of claims 1 to 3, 5 or 6 or a vector according to claim 14.

20

17. A method of obtaining a polynucleotide as defined in claim 1 to 3, 5 or 6 comprising replication of a vector as defined in claim 14 or synthesis of the polynucleotide by condensation of nucleotides.

18. An organism which is transgenic for a polynucleotide as defined in any one of claims 1 to 3, 5 or 6.

25

19. An organism which has been genetically engineered to render a polynucleotide or protein as defined in any one of claims 1 to 3, 5 or 6 non-functional or inhibited.

20. An antibody which is specific for a protein as defined in any one of claims 1 to 3, 5 or 6.

30

21. A method for preventing or treating a fungal infection comprising administering an anti-fungal agent identified by the method of any one of claims 1 to 6.

5 22. A method for preventing or treating a fungal infection comprising administering a protein or polynucleotide as defined in any one of claims 1 to 3, 5 or 6.

23. A method of killing, or impairing the growth of, a fungus comprising inhibiting the expression or activity of a polynucleotide or protein as defined in any one of claims 1 to 3,
10 5 or 6.

24. A method according to claim 23 wherein the fungus has infected a human, animal or plant individual.

15 25. A fungus which has been killed, or whose growth has been impaired, by inhibition of the expression or activity of a protein or polynucleotide as defined in any one of claims 1 to 3, 5 or 6.